

# APPLIED MATHEMATICS COLLOQUIUM

## PFAFFIAN ORIENTATIONS OF GRAPHS

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### ABSTRACT:

An orientation of a graph  $G$  is Pfaffian if every even cycle  $C$  such that  $G \setminus V(C)$  has a perfect matching has an odd number of edges directed in either direction of the cycle. The significance of Pfaffian orientations is that if a graph has one, then the number of perfect matchings (a.k.a. the dimer problem) can be computed in polynomial time.

The question of what bipartite graphs have Pfaffian orientations is equivalent to many other problems of interest, such as a permanent problem of Polya, the even directed cycle problem, or the sign-nonsingular matrix problem for square matrices. These problems are now reasonably well-understood.

The speaker will briefly survey the above topics, and then will discuss recent results toward characterizing general graphs that admit Pfaffian orientations. These were obtained by or jointly with Serguei Norine.

**MONDAY, NOVEMBER 13, 2006**

**4:30 PM**

**Building 2, Room 105**

*Refreshments at 4:00 PM in Building 4, Room 174  
(Math Majors Lounge)*

Applied Math Colloquium: <http://www-math.mit.edu/amc/fall06>  
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